

Section II – Comprehensive Nutrient Management Planning

Development of Comprehensive Nutrient Management Plans at the Field Office Level

The purpose of this document is to provide technical guidance for the development of a Comprehensive Nutrient Management Plan (CNMP), whether they are developed for USDA's voluntary programs or as a means to help satisfy the United States Environmental Protection Agency's (USEPA) National Pollutant Discharge Elimination System (NPDES) permit requirements.

The information in and attached to this document should be used by field office staff when developing CNMPs. This technical guidance is not intended as a sole-source reference for developing CNMPs. Rather, it is to be used as a tool in support of the conservation planning process, as contained in the National Planning Procedures Handbook (NPPH).

A CNMP is a conservation system that is unique to animal feeding operations. A CNMP is a grouping of conservation practices and management activities which, when implemented as part of a conservation system, will help to ensure that both production and natural resource protection goals are achieved.

The conservation practices and management activities planned and implemented as part of a CNMP must meet NRCS technical standards. A CNMP, according to Part 600.5 – Comprehensive Nutrient Management Planning Technical Guidance Subpart E of the NPPH, must address at least four of six elements:

1. Manure and Waste Water Handling/Storage;
2. Nutrient Management (Manure/Fertilizer Management);
3. Land Treatment (Erosion and Runoff Control); and
4. Record-keeping (Land Application and Facility Management Records).

Two other elements should be considered when developing a CNMP:

5. Other Waste Utilization Options and
6. Feed Management.

The last two elements require specific technical expertise (i.e. animal nutritionists or university professionals) and are not a required part of the CNMP, unless the client decides to implement one of them. Technical Assistance notes should document that these elements were discussed with the client.

In working with Animal Feeding Operation (AFO) owners and/or operators, practical and technically feasible CNMP alternatives must be developed and meet their needs. Alternatives may include a mixture of structural and/or management practices. The AFO owner and/or operator, as the decision-maker, selects from these alternatives to create a CNMP that best meets their management objectives and address environmental concerns.

CNMP implementation may require additional design, analysis or evaluations. Operational changes may cause partial or complete revisions to the planned alternatives. It is important for the planner to maintain a relationship with the client during CNMP implementation to address changes or new challenges.

Follow-up site visits are necessary to evaluate whether the implemented alternatives are meeting client needs and addressing environmental concerns. Adjustments may need to be made if an alternative is not meeting the clients' objectives or addressing environmental concerns.

Comprehensive Nutrient Management Plan Checklist/Guidance

I. Collect Resource Inventory.

When a client expresses an interest in any aspect of a CNMP (e.g. cost-share, to address NDEQ requirements, etc.), start the CNMP planning process by collecting the client's resource inventory information in one of the two following ways:

- 1) Interview the client and complete the Inventory Job Sheet for Comprehensive Nutrient Management Plans (NE-CPA-73), or
- 2) Provide the client the NE-CPA-73 with a brief explanation on completing it and set up an interview date to review and finalize.

The NE-CPA-73 has been developed to maintain consistency in the collection of inventory information and land application maps for developing a CNMP. The NE-CPA-73 has been divided into sections as listed below.

The NE-CPA-73 must be completed fully and thoroughly to develop a sound CNMP. Sections within the NE-CPA-73 that are not applicable to the operation shall have an "N/A" placed in that section. For example, for livestock operation without existing manure storage structures, place an "NA" in existing storage structure sections. If additional information or maps are attached to the NE-CPA-73, please indicate "refer to" or "see the attached" in the corresponding section.

If the client is working with a Technical Service Providers (TSP), attach pertinent information from the TSP. Examples of pertinent information include:

- Construction approval application / design packets;
- Animal inventories,
- Waste storage inventories;
- Nutrient Management Plans;
- Engineering design / layout and estimated quantities for storage facilities; and

The sections in the NE-CPA-73 include:

Section 1 - Client Information & Objectives

- Name, address, and contact telephone number,
- Location of livestock operation,
- Client's objectives;

Section 2 - Livestock Information

- Livestock type, numbers & average weight,
- Future plans (expansion, reduction, or changes in animal type);

Section 3 -Existing Manure & Waste Water Handling / Storage Facility Information

- Treatment & manure handling system (solids settling basins, clean water diversion, manure treatment, handling, management of facility, current emptying schedule/management/O&M, and critical pumping levels),
- Manure and waste water storage facility capacity (types & size of storage facilities),
- Livestock, waste water, drainage acres, and other pertinent information for each manure storage facility (livestock type & numbers, process water, runoff water),
- Map or sketch of livestock operation, manure storage facility and components;

Section 4 - Land Application Sites & Nutrient Management Information

- Client 156 EZ & FSA-578 forms (when available) of available land application sites;
- Maps (aerial photos, soils maps, USGS maps) for the land application areas that shows:
 - Sensitive Areas
 - Sandy soils,
 - Streams, lakes, frequently flooded sites, wetlands, drainage courses, etc.,
 - Ephemeral & classic gully erosion areas,
 - Soils & Soils Descriptions (soils & slopes),
 - Existing Land Treatment Practices (buffers, waterways, terraces, etc.);

- Cropping history
 - Legal descriptions and maps of land available for manure application,
 - Land use (dryland cropland, irrigated cropland, pasture, hayland) and farmable acres,
 - Land ownership (owned, rented or manure application agreements),
 - Crop information (crop rotation & yields),
 - Nutrient application (average rate, time, method, form and placement);
- Tillage inventory necessary for RUSLE2 and/or P-Index Risk Assessment with Erosion Estimator calculations for land application sites;
- Other land application site & nutrient management information
 - Manure analysis,
 - Equipment calibrations,
 - Crop consultants reports,
 - Irrigation water analysis, and
 - Manure sales or transfers;
- Description of current nutrient management record-keeping system;

Section 5 – Manure Transfer & Waste Application Equipment Inventory

- Type, size, quantity, average application rate of equipment
 - Manure application equipment (i.e. honey wagons, spreaders, trucks, & loaders),
 - Irrigation equipment (i.e. pivots, or gravity irrigation), and
 - Transfer equipment (i.e. pit pumps, transfer stations, loaders);

Section 6 – Other Information (as applicable)

- Feed management information,
- Other waste treatment or utilization options (composting, methane collection, other), and
- Other pertinent information.

II. Evaluation of Nutrient Management, Manure Storage Facility Capacity, Manure Transfer & Land Treatment Using the Appropriate Tools.

At the livestock operation, review the completed NE-CPA-73 with the client and discuss the livestock operation, manure storage/transfer, land treatment, and preliminary nutrient management analysis (refer to items A-D below for specific items). Present and discuss initial alternatives with the client. Alternatives shall take the client's objectives into account.

A. Nutrient Management & Land Treatment (Utilize tools such as NE-ENG-82, P-Index Risk Assessments, N Leaching Potential, Volume Spreadsheet, and NE-ENG-81):

- 1) Nutrient Management Analysis:
 - Estimate acres needed for Nitrogen, Phosphorus and Potassium using NE-ENG-82 spreadsheet, or UNL Nutrient Inventory Spreadsheet.
 - Use proven yields if provided otherwise use county averages.
 - Evaluate whether an N-based or P-based plan is needed depending on P-Index Risk Assessment Value, or alternative uses for manure are identified.
 - Production info/volume and type of manure to be applied quantified to compare to the available equipment and manpower.
- 2) Utilize plan maps, aerial photos, soils maps, USGS maps, and on-site evaluations to evaluate or identify the following:
 - Delineate land application sites on plan maps, soils maps, USGS maps at the same scale.
 - Identify sensitive areas on maps
 - Sandy soils,
 - Streams, lakes, frequently flooded sites, wetlands, drainage courses, etc.,
 - Ephemeral & classic gully erosion areas;
 - Identify spreadable acres and manure setbacks next to streams on maps.

- Complete N Leaching Potential for application sites (especially those with sandy soils) according to instructions on the NE-CPA-38 (Appendix A of the Nutrient Management 590 Standard).
 - Identify/evaluate need for buffers on maps (filter strips, riparian buffers) for adequacy in protecting water courses.
 - Evaluate the need for new practices and determine the adequacy of existing measures in controlling ephemeral gullies.
 - Delineate and identify soils & soil descriptions for all tracts & fields.
 - Evaluate land treatment practices – existing and proposed and identify on maps.
- 3) RUSLE2 or equivalent erosion rates are documented based on land treatment measures in place & those to be implemented (fields can be grouped when appropriate).
- 4) P-Index Risk Assessments completed for each application site (consistent with manure management and land treatment measures):
- Complete P-Index Risk Assessment for current practices & planned practices. The expected rise in soil test levels shall be accounted for when applying manure beyond P-removal basis.
 - Identify fields with a “High” index values on the conservation plan maps by highlighting or hatching with an obvious color.
 - Identify manure setbacks, manure management practices, land treatment practices, buffers and other practices and measures to be implemented (maintain a listing of these measures to be incorporated into the nutrient management plan and/or conservation plan).
- B. Manure Storage** (Utilize the AW-Forms, NE-ENG-81, NE-ENG-82, or AWM software):
- 1) Evaluate adequacy of existing and proposed manure storage structure based on manure and waste water (or runoff water) being produced; the solids accumulation volume, treatment volume, total storage capacity, seepage potential, structural soundness, ability to empty facility with existing or planned equipment on a timely basis and other pertinent factors.
 - 2) Determine if the existing and proposed manure storage / treatment structure is compatible with application equipment and available landbase, critical pumping levels, and timeline / schedule managing pumping levels.
- C. Manure Transfer and Waste Application** (Utilize the NE-ENG-82):
- 1) Determine/evaluate the timeline needed to apply manure or waste water with existing/planned application equipment.
 - 2) Evaluate the adequacy of the type and size of irrigation equipment, pumps, application equipment to apply the volume and type of manure / runoff water, distance of travel to the application site, man-power available for application or use of commercial application equipment in order to apply the manure in a timely basis.
- D. Other Utilization Alternatives:**
- 1) Evaluate other utilization alternatives if applicable such as waste treatment strips, composting, methane, marketing manure, etc.

III. Present Preliminary NMP, Land Treatment, Manure Storage/Transfer or other Utilization Option Alternatives to Client for final decision.

A. NMP Alternatives:

- 1) Review and present preliminary NMP to client that summarizes the following information obtained in Steps I & II:
 - Animal types/numbers/weights,
 - Existing and / or planned livestock waste control facilities,
 - Total Acres needed for N and P,
 - Total acres available to utilize manure (include agreement acres, if applicable);
 - Crop rotations/sequences/yields,
 - Summary list of application sites (fields) with acres, initial P-Index Risk Assessment values, erosion rates, current soil test levels (within the last 3 years) and whether irrigated / dryland / pasture / hayland,

- Application equipment available with capacities, and if owned or rented,
 - Manure quantities & anticipated loads hauled or hours of operating time for a pump,
 - Planned manure application rates and timing by manure type (i.e. 15 tons/ac. solids every fall and 5 ac.-in./acre liquids during the growing season);
 - Planned methods of application of manure;
- 2) If additional application land must be obtained, ensure the client understands this. If associated with a NDEQ permit, agreement forms should be provided.

B. Land Treatment Alternatives:

- 1) Visit the land application sites and discuss the land treatment or other measures needed to reduce erosion and P-Index Risk Assessment values; including buffers, erosion control practices, nutrient management measures, and manure transfer alternatives.

C. Manure Storage/Transfer Alternatives

- 1) Gather information needed to complete a rough engineering design/estimate to ensure that manure storage/transfer and land treatment practices/alternatives are practical.
- Complete an on-site review of the production area and review the site information from the NE-CPA-73 to determine accuracy. (Check foreign drainage and drainage patterns, especially for open lot operations).
 - Complete Preliminary Estimated Capacity & Cost Estimate for the Storage Facility and Land Treatment Practices:
 - Re-evaluate existing storage and manure transfer components/facilities, if applicable, to determine the need for additional storage.
 - Re-evaluate/determine storage requirements using appropriate design tools (AW-FORMS spreadsheet, NE-ENG-81, AWM, etc.). Evaluate summaries from NE-ENG-81.
 - Complete a rough layout of planned facilities using GIS software or Terramodel or hand drawn on aerial photos.
 - Estimate quantities of earthwork, pipe concrete, clay liner, etc. (If a design has already been completed by a TSP, ask client to get estimated quantities from TSP.)
 - Conduct additional site visit(s) to complete engineering alternatives if necessary (initial geology/soil investigations may be necessary, and/or open lot operations may require additional site visits due to the land slope, drainage patterns, foreign drainage, etc.).

D. Other Utilization Alternatives

- 1) As appropriate, present options on waste utilization alternatives, including but not limited to composting, methane digesting, etc.

E. Document client's final decision for Nutrient Management, Land Treatment and Manure Storage/Transfer, other Utilization Options and assemble NMP and Conservation plan according to Section IV below.

IV. Assemble Conservation Plan, Nutrient Management Plan and Associated Contents (Refer to NPPH State Supplements Section 1 for guidance on assembling conservation plans).

A. Conservation Plan and Associated Contents

- 1) Land Application Sites (land treatment and nutrient management practices):**
- Plan map of individual fields that identifies all structural measures, manure setbacks (spreadable acres), buffers, waterways & environmentally sensitive areas (streams, wetlands etc.) identified.
 - Soils maps and descriptions, USGS maps of land application areas.
 - Document existing and planned land treatment and nutrient management measures, location, amount and schedule of application in customer service toolkit.
 - Practices are consistent with P-Index Risk Assessment.
 - Includes all runoff and erosion control practices such as waterways, terraces, grade stabilization structures, underground outlets, filter strips, other buffers, etc.

- Nutrient management measures (i.e. setbacks; N- or P-based rates; timing, form, & method of application, etc.) according to Practice Standards 590 & 633 on all application sites (consistent with NMP).

2) Manure Transfer / Storage :

- Document Existing and Planned Manure Transfer / Storage (clean water diversions, basins, storage facilities, treatment lagoons, pumps & other handling measures etc.) in customer service toolkit.
 - Cost estimate and components identified (i.e. earthwork, liner, pipe, pumps, etc.),
 - Location and size of manure storage facility are compatible with the planned practices, geological investigation and site conditions.

3) Other Utilization Options:

- Document practices for other utilization options / practices such as waste treatment strips, methane digester, composting facility, and feed management in customer service toolkit if appropriate.

B. Nutrient Management Plan Contents:

- 1) Final NMP that meets all requirements in NPPH; Practice Standards 590 & 633; and includes the following:
 - Animal types / numbers / average weights;
 - Existing and / or planned livestock waste control facilities;
 - Sketch of livestock feeding area identifying all components
 - Total acres needed for N and P;
 - Total acres available to utilize manure (include agreement acres, if applicable);
 - Crop rotations / sequences / yields;
 - Summary list of application sites (fields) with acres, initial P-Index Risk Assessment values, current soil test levels (within the last 3 years) and whether irrigated / dryland / pasture / hayland;
 - Application equipment available with capacities, and if owned or rented;
 - Manure quantities and anticipated loads hauled or hours of operating time for a pump;
 - Planned manure application rates and timing by manure type (i.e. 15 tons/ac. solids every fall and 5 ac-in./acre liquids during the growing season);
 - Planned methods of application of manure.
- 2) Summary of P-Index Risk Assessments and N Leaching Potential,
- 3) Summary/examples of nutrient management and record keeping.
- 4) Summary/table listing timing, form, method, rate (N- or P-based plan, rotation or combination), setbacks & other management measures to be utilized on each application site.
- 5) Summary / table listing existing and planned equipment / components to be used in manure transfer and application, application site, and amount and schedule of application:
 - Include manure transfer equipment, pumps, application equipment and manure handling measures to be used in applying manure / waste water.

C. Optional Contents:

- 1) Provide client copies of inventory and analysis information as appropriate for background information (i.e. engineering estimates, NE-ENG-82 etc.).

V.Design Land Treatment, Manure Storage, Manure Transfer Practices and Complete State Permit Application.

A. Design Practices per Standards and Specifications, Practice Documentation Requirements and Statement of Work for appropriate practices per Section IV of FOTG.

B. Ensure that Federal, State, County, and Local permits, rules and regulations are addressed and appropriate information is submitted to NDEQ along with design (examples of these are listed below):

- 1) Nutrient Management Plan
- 2) Manure Application Agreements,
- 3) O&M Plan,
- 4) Sludge & Sediment Plan,
- 5) Emergency Response Plan,
- 6) Chemical Storage Plan,
- 7) Mortality Plan,
- 8) Closure Plan,
- 9) Odor Management Plan (as applicable),
- 10) Notice of Intent (NOI) for NPDES permit (if applicable),
- 11) Ground Water Monitoring Plan (if applicable),
- 12) County Zoning Requirements,
- 13) NRD Requirements, or
- 14) Other Requirements.

VI. Layout, Installation and Checkout of Land Treatment, Manure Storage, & Manure Transfer Practices.

A. Layout Practices per Standards and Specifications, Practice Documentation Requirements and Statement of Work for appropriate practices per Section IV of FOTG.

B. Install practices per Standards and Specifications, Practice Documentation Requirements and Statement of Work for appropriate practices per Section IV of FOTG

- 1) Follow-up with the client by conducting occasional site visits during the installation of practices to ensure that practices are being installed correctly or if adjustments are needed.
- 2) Complete adjustments and revisions to planned practices as necessary to fit site conditions and other elements of the CNMP.
- 3) Review/provide client with practice operation and maintenance requirements, record keeping requirements, nutrient management plan requirements, and all other elements of a CNMP during the final installation stage.

C. Checkout and Document Practices per Standards and Specifications, Practice Documentation Requirements and Statement of Work for appropriate practices per Section IV of FOTG:

VII. Follow-up with Client to Review Operation and Maintenance of Practices Installed, Nutrient Management Plan Implementation and Record-Keeping, and Reporting CNMP.

NRCS follow-up visits are important to evaluate the effectiveness of conservation practices and review CNMP records kept by the operation. Annual reviews are highly recommended. The "CNMP Follow-Up Inspection" Sheet can be used for guidance/documentation during a site review.

Review the following items during follow-up visits to verify CNMP implementation and adjustments needed:

A. Land Treatment Practices (includes site visit of applicable fields):

- 1) Determine if practices have been implemented and match the P-Index Risk Assessment (adjust as necessary).
- 2) Determine if existing practices have been maintained or if there is a need for new practices.
- 3) Determine if additional erosion control measures are needed.

B. Nutrient Management :

- 1) Review nutrient management plan including soil testing, manure analysis, nutrient budget, nutrient timing, form and rate and other measures identified in NMP and determine if practice is implemented according to 590 Nutrient Management Standard requirements.
 - Determine if any adjustments to NMP are needed based on manure analysis, soil test results or other factors.
 - Determine if any changes made to NMP and Land Treatment Practices portion of the CNMP are needed (based on the P-Index, and N Leaching Index assessments).
- 2) Review and discuss the records with the client.
 - Provide the client feedback on current record keeping (refer to record-keeping) and documentation practices. Discuss with the client what benefits he has received from the current record keeping system.
 - Discuss with the client the weak areas and/or inadequate documentation found in the current record keeping system. Provide direction on how to improve record keeping.

C. Manure Transfer / Storage Facility.

- 1) Evaluate the manure transfer / storage facility and determine if it is working as designed and meeting the objectives of the client.
- 2) Discuss overall operation of the system with the client, including the pros and cons.
- 3) Discuss record-keeping requirements for facilities and manure transfer.
- 4) Determine if adjustments are needed, and obtain any applicable permits prior to adjusting the system.

D. Other Utilization Options

- 1) Evaluate alternative manure practices and determine if practice is meeting objective of client.
- 2) Discuss conclusions with client and determine if additional adjustments are appropriate.

E. Record-Keeping

- 1) Accurate records provide a foundation for decisions related to CNMP implementation, documentation of events, facility maintenance, nutrient management plan implementation, and legal evidence in the event of litigation.
- 2) Records should be retained for a period of five years.
- 3) Evaluate the following records and determine if appropriate records are being kept and client objectives are being met:
 - Nutrient Management
 - Annual manure test for nutrient contents for each manure storage containment;
 - Current soil test results, in accordance with Nutrient Management 590;
 - Cropping information
 - (i) Crop planted and planting and/or harvesting dates by field,
 - (ii) Crop yields,
 - Application records for each manure type or commercial fertilizer application event
 - (i) Source, type and form of manure and/or commercial fertilizer,
 - (ii) Field(s) where manure and/or fertilizer are applied,
 - (iii) Application method & equipment used.
 - (iv) Application rate applied per acre or amount applied to each field,
 - (v) Time and date of application,
 - (vi) Weather and soil conditions during application;
 - Calibration of application equipment;
 - Transfer of manure off-site to third parties:
 - (i) Amount and date
 - (ii) Recipient name & address,
 - (iii) Nature of transfer (sold or given).

- Manure Storage Facility (s)
 - Dates of emptying, level before emptying, and level after emptying;
 - Discharge of overflow events, including level before and after event;
 - Records of maintenance performed with operation and maintenance plans;
 - Activities associated with emergency spill response plan.
 - Production Area
 - Daily livestock capacity records;
 - Dates and numbers of any losses, disposal method;
 - Inspections of storm water diversions and structures;
 - Inspections of water lines, including drinking and cooling water;
 - Deficiencies found, corrections actions, and repairs completed;
 - Dates and amount of precipitation.
 - Changes to CNMP
 - Livestock production;
 - Manure storage facility;
 - Application equipment;
 - Application sites.
- 4) Determine if adjustments to existing record keeping system are appropriate.
- Review all adjustments to existing record-keeping system with client.
 - Verify all records that need to be kept with client

F. Report CNMP as Applied

- 1) After verifying implementation of all elements of a CNMP including; Manure Transfer / Storage Facility, Nutrient Management, Recording Keeping Land Treatment, and if applicable Other Utilization Options report CNMP as Applied.